AN INTRODUCTION TO DATA VISUALIZATION

HOW TO DESIGN COMPELLING CHARTS & GRAPHS THAT ARE EASY TO UNDERSTAND

HubSpot

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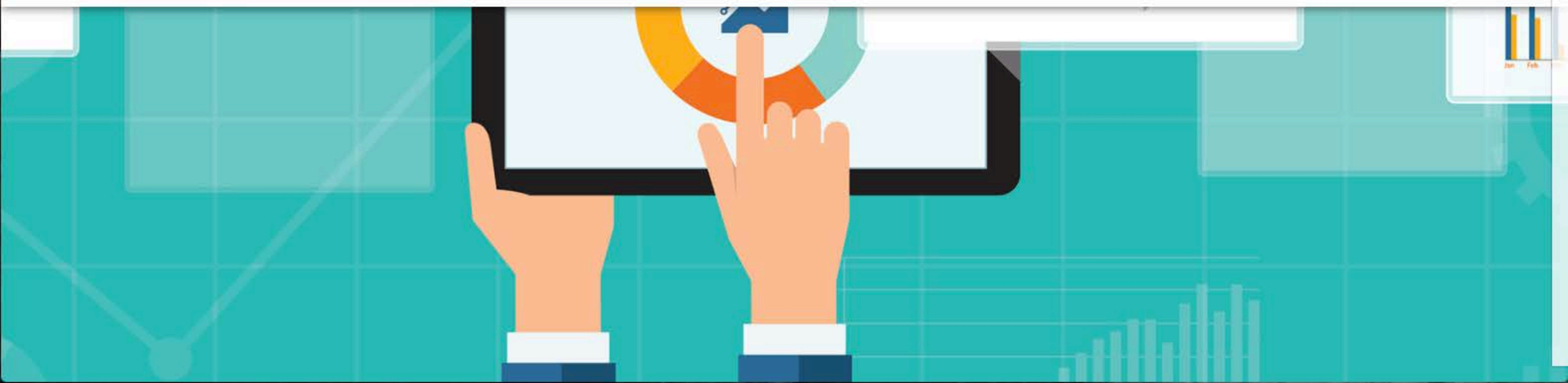


INTRODUCTION

Your data is only as good as your ability to understand and communicate it. You need to be able to understand and effectively communicate the *story* behind those numbers.

The best way to tell a story with your data is by visualizing it using a graph or chart. When you can visualize your data in one of these formats, you'll be able to more easily uncover patterns, correlations, and outliers, communicate insights to your boss, your team, or your company, and make data-backed decisions.

It's important that you choose the *right* method of visualizing your data for any given data set. If your data is misrepresented or presented ineffectively, you and your team will lose out on key insights and understandings – which hurts both your message and your reputation.

The good news is that you don't need a PhD in statistics to crack the data visualization code. This guide will walk through the best ways to present different types of data, a brief history of data visualization, why data visualization is important, and tips on analyzing and displaying your data effectively. If your technical skills don't extend much beyond Microsoft Excel (you're not alone!), then check out the list of the best data visualization tools we've included as well.

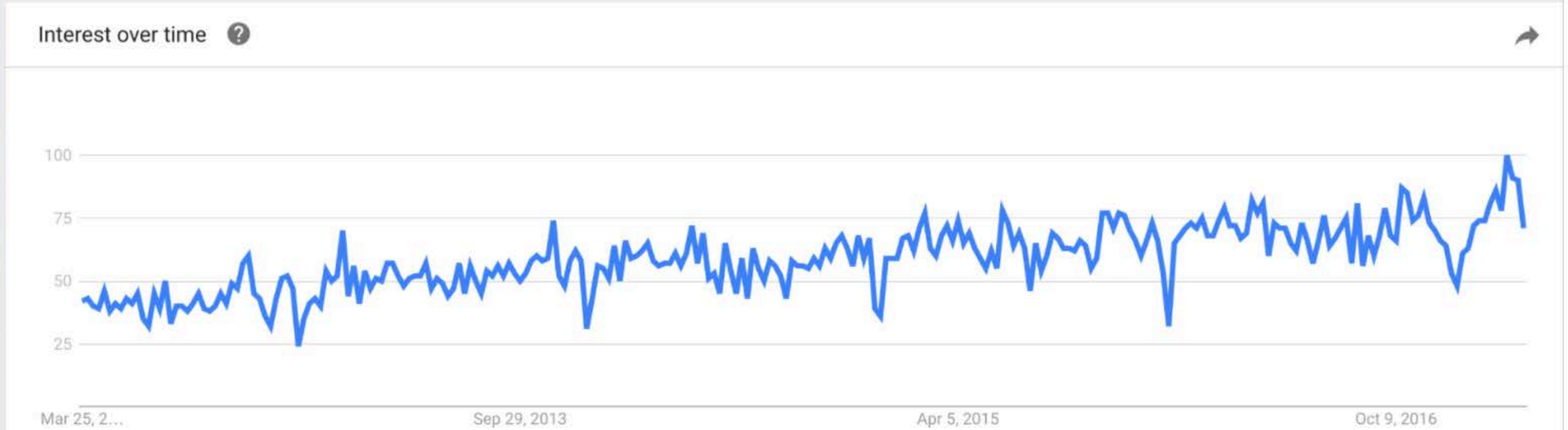
Ready to make a big impact with your data? Let's jump right in.

CHAPTER 1: WHAT IS DATA VISUALIZATION?

Data visualization refers to **showcasing data, numbers, and statistics through images and charts.**

When you display data visually, you'll be able to more easily tease out meaningful patterns from a set of otherwise indecipherable numbers, and it makes it easier to draw conclusions and make informed decisions.

Here's a simple example of using data visualization to show a trend over time. Below is a chart from Google Trends that shows how many people searched for the term "data visualization" in Google over a five-year period:

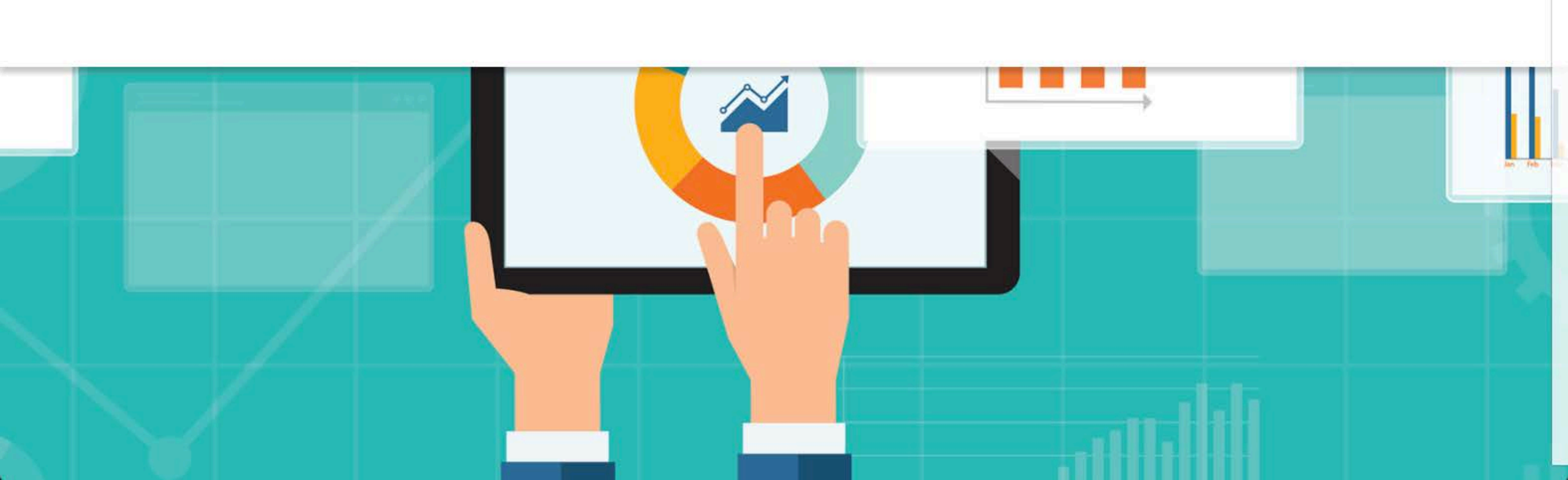


Source: Google Trends

The numbers may go up and down and up and down over short periods of time, but if you look at the larger picture, you'll see that search volume is trending steadily upward.

Data visualization is especially helpful when you're presenting data to others. It's much easier for people to understand data when it's presented visually – which makes it easier to prove a theory or make a point, too. Marketers can use data visualization to showcase the results of a campaign; scientists can use it to predict illness outbreaks; farmers can use it to map out agricultural trends.

You can also use data visualization to display part-to-whole data, ranking, correlation, geographical distribution, deviation, timelines, and scale. Data visualization can simplify and showcase results, explore trends, and try to discover something new within a set of data.



CHAPTER 2: A BRIEF HISTORY OF DATA VISUALIZATION

For centuries, data visualization has helped those in the fields of mathematics, epidemiology, business, science, and marketing to draw conclusions, discover patterns, and make decisions informed by the facts rather than "gut feelings." One of the first examples of data visualization dates back to the eighteenth century.

1769

Johann Lambert used charts to catalogue water evaporation experiments. He was among the first recorded scientists to use scientific visualization to describe and analyze data.

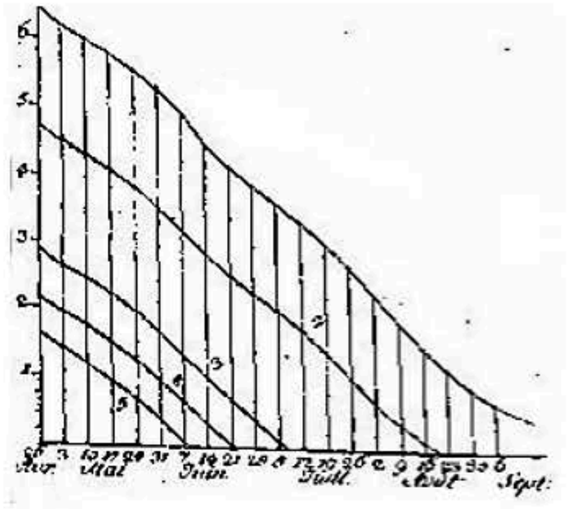


Image Source: University of Washington

1864

The nineteenth century marked the beginning of modern graphics. One notable example came from John Snow, who used plot points on a map for each case of cholera in London. He concluded that a water pump in an area called Broad Street might be the source of the outbreak, due to the distribution of cases. This is a prime example of a distribution visualization.

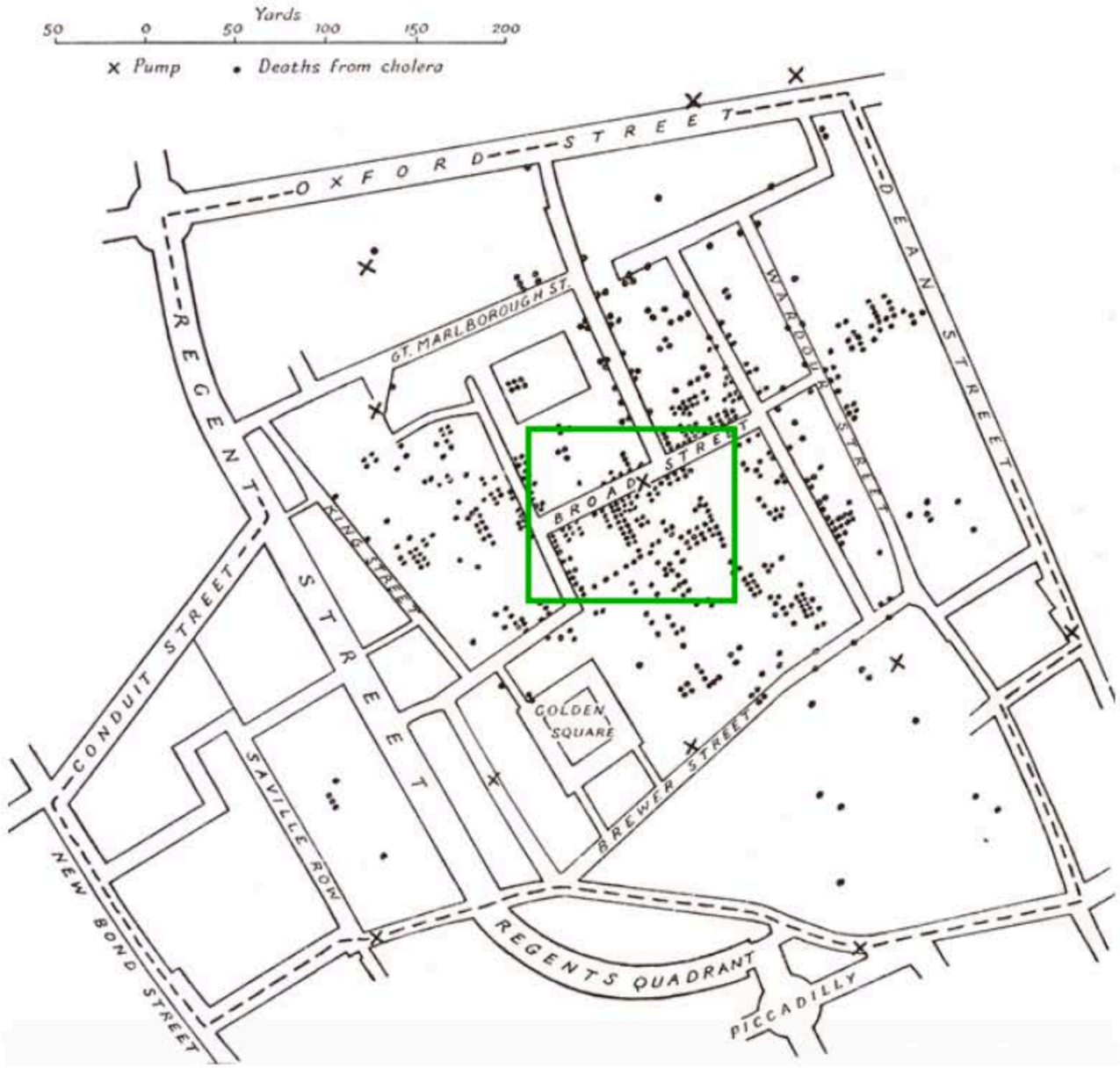


Image Source: University of Washington

1885

Etienne Jules Marey invented the first iteration of what is now the blood pressure cuff: the sphygmograph. It was a portable device that could record the human pulse visually on paper, and it was one of the first ways that blood pressure was measured visually.

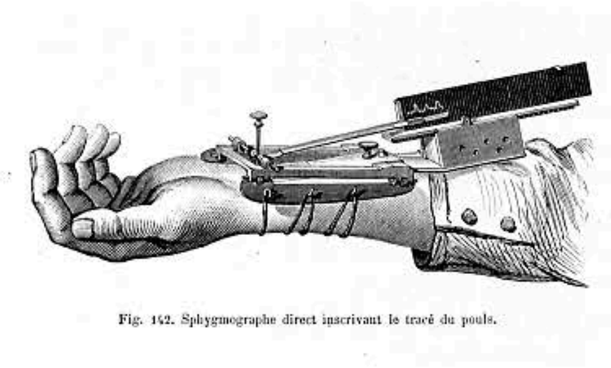


Fig. 142. Sphygmographe direct inscrivant le tracé du pouls.

Image Source: University of Washington

1901

Arthur Bowley created this time-series graph mapping out the value of European goods sold over successive ten year periods.

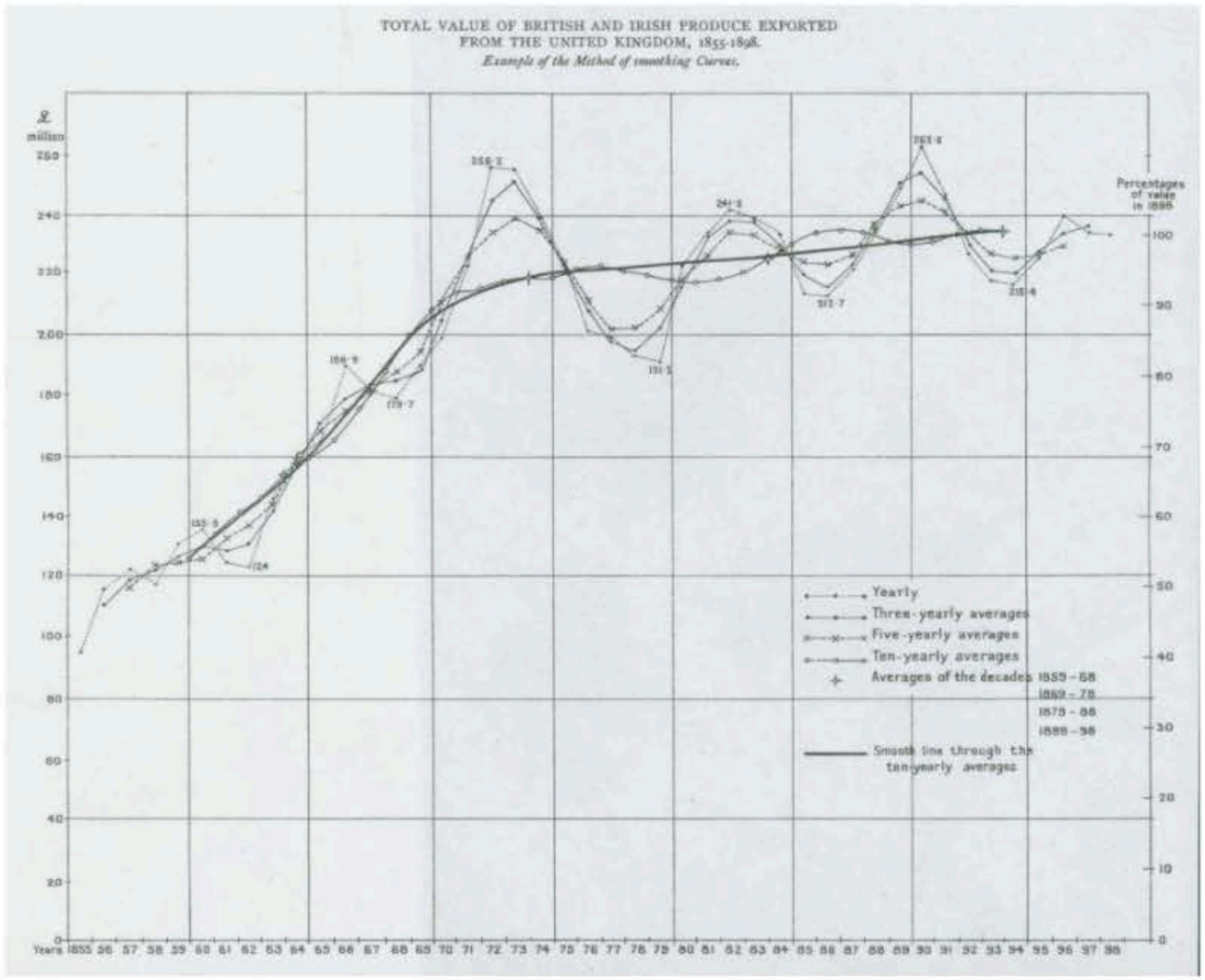
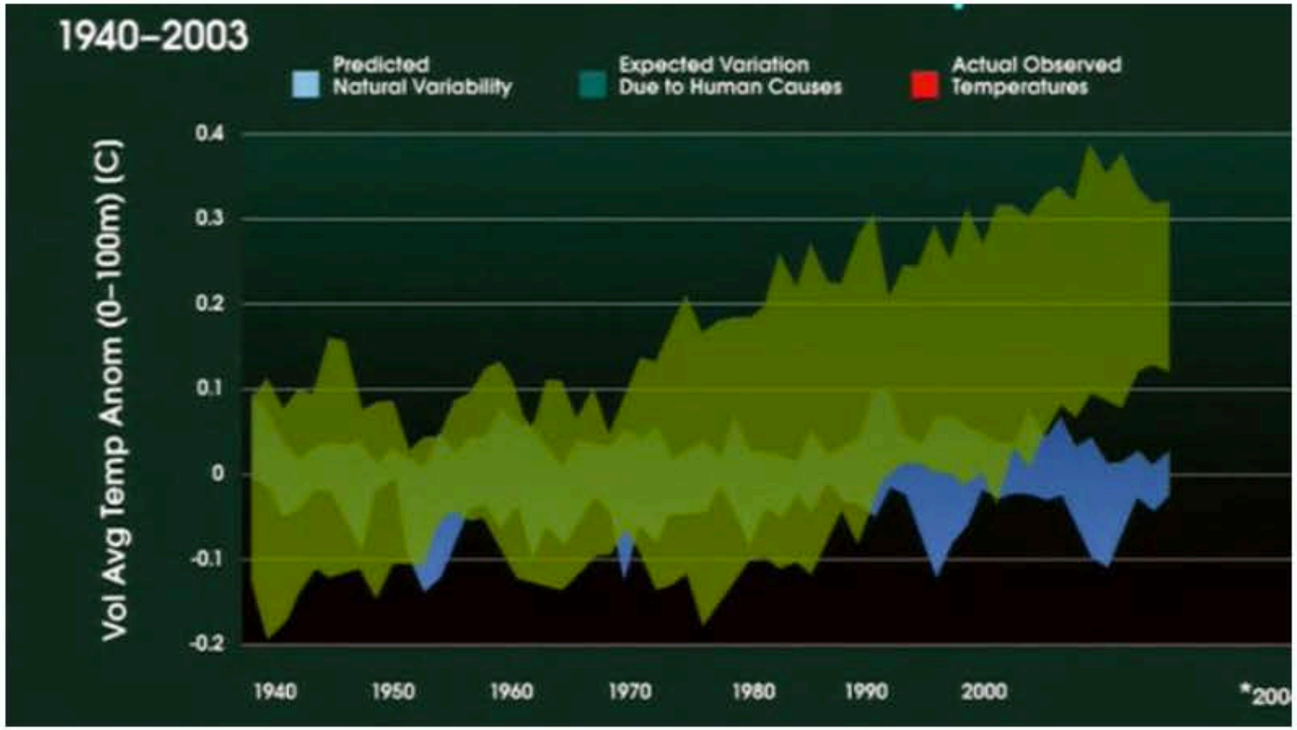


Image Source: York University

2006

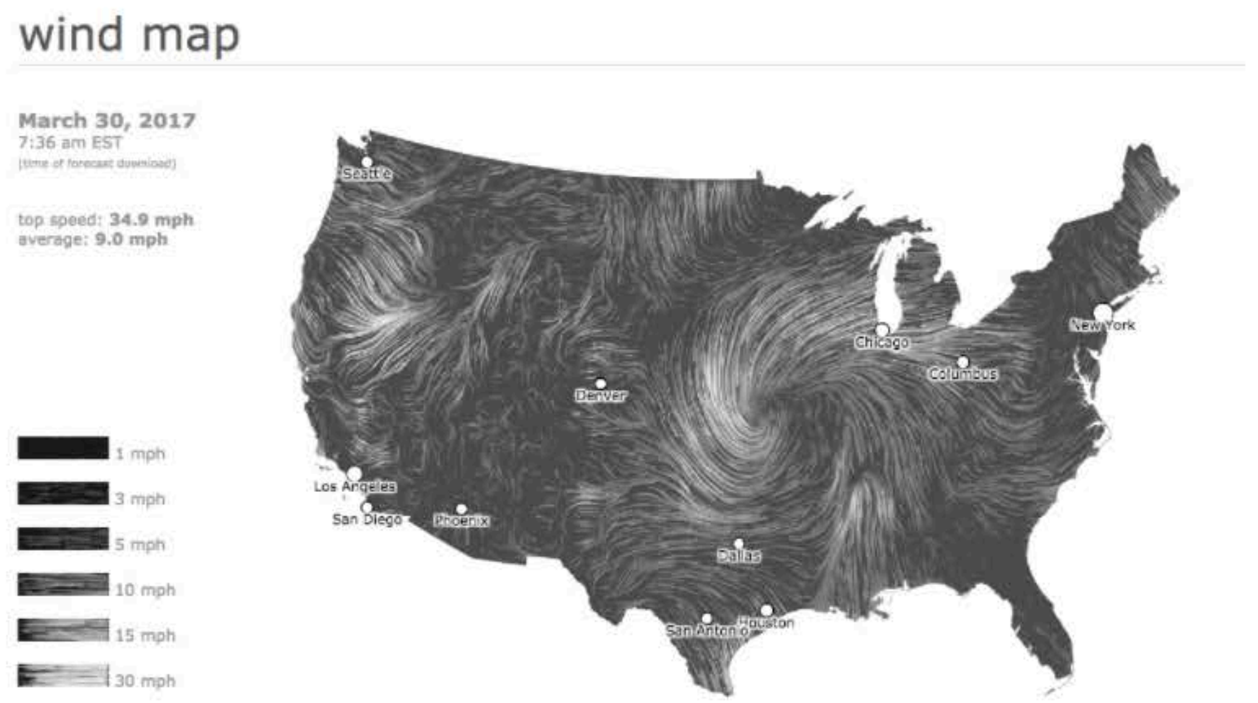
Al Gore's film *An Inconvenient Truth* used data visualization to persuade audiences of the dangers of global warming. The film serves as a great example of the impact that data can have on persuading an audience. (You can take a look at more of the visualizations in this visualization library.)



Today

Nowadays, data visualization has made its way into many different disciplines: from journalism to business to research.

Some of the most captivating examples of data visualization today are interactive, thanks to advances in technology, like the real-time map of wind direction and speed below from Fernanda Viégas and Martin Wattenberg, who are dedicated to inventing new ways for people to think and talk about data.



Data visualization has come a long way since the days of handwritten charts and graphics. Thanks to the development of highly interactive statistical computing systems, anyone can create data visualizations. Now, let's get into why data visualization is important and how to get started yourself.

CHAPTER 3: WHY IS DATA VISUALIZATION IMPORTANT?

Data visualization is important in identifying trends, answering questions, proving theories, and – if you're creating them for a business – in showcasing your brand. When you visualize your data, you can more easily see numbers in context and understand how they relate to one another.

When it comes to processing information, we are wired to comprehend images much faster and more easily than text. According to research from SH!FT Disruptive Learning, **humans process visuals 60,000 times faster than text.** What's more, visuals are far more memorable than text is. The same research study found that **after three days, test subjects retained 10-20% of written or spoken information and a whopping 65% of visual information.**

Take a look at the two data sets below. Both represent the exact same numbers, but one of them is displayed in a table format, the other in a bar chart. Which version is easier to interpret? Which would *you* choose to communicate this information to an audience?

Earnings and unemployment rates by educational attainment, 2015

Education attained	Unemployment rate in 2015 (Percent)	Median weekly earnings in 2015
Doctoral degree	1.7	$1,623
Professional degree	1.5	1,730
Master's degree	2.4	1,341
Bachelor's degree	2.8	1,137
Associate's degree	3.8	798
Some college, no degree	5.0	738
High school diploma	5.4	678
Less than a high school diploma	8.0	493
All workers	4.3	860

Note: Data are for persons age 25 and over. Earnings are for full-time wage and salary workers.
Source: Current Population Survey, U.S. Department of Labor, U.S. Bureau of Labor Statistics

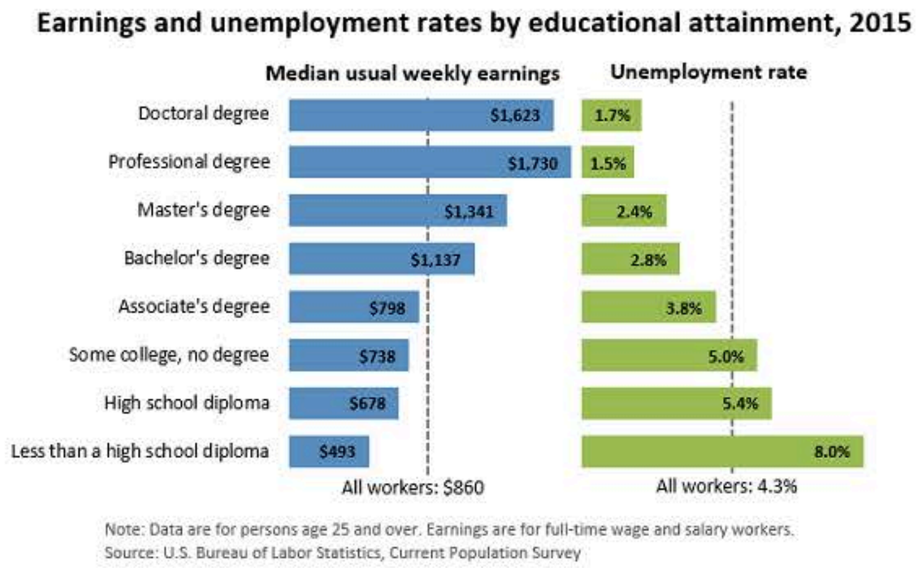


Image Source: U.S. Bureau of Labor Statistics

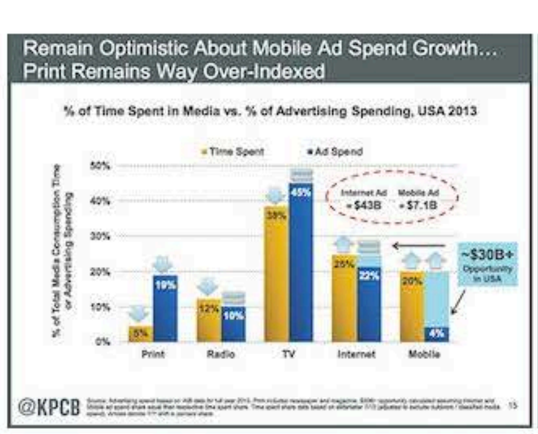
Chances are, the answer is the bar chart. While having the raw data in a table format is handy, when you're trying to present to or persuade others, visualizing your data is a good way to present an argument, tell a story, and inspire people.

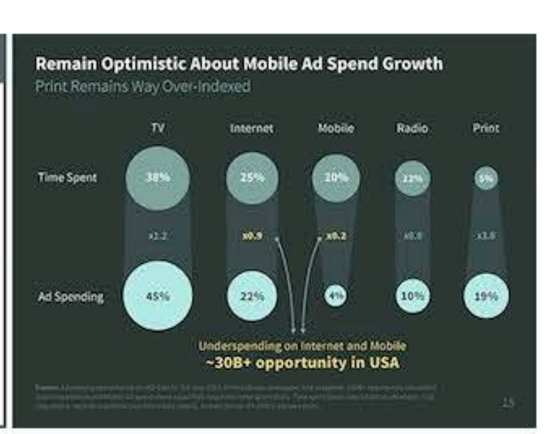
Why Data Visualization is Important for Presentations

Have you ever attended a presentation where someone else's presentation stood out to you thanks to its clear representation of data? We're willing to bet many of you had. Data visualization improves the impact and recall of your message or argument.

Accurate visualization of data can make or break a business presentation.

Let's take a look at an example. Below, you'll see two versions of the same slide from a presentation deck. The first, with the white background, is the actual presentation slide; the second is a re-imagining of that slide from Professional Presentation Designer Emiland de Cubber.





When you look at that first slide, can you tell where the story in the data starts and ends?

There's so much going on in her slide that it's quite difficult to tell. De Cubber turned the bar chart into a bubble chart because it "seems more appropriate and visually convincing," he said. "It's easy to compare and the conclusion in yellow is very clear."

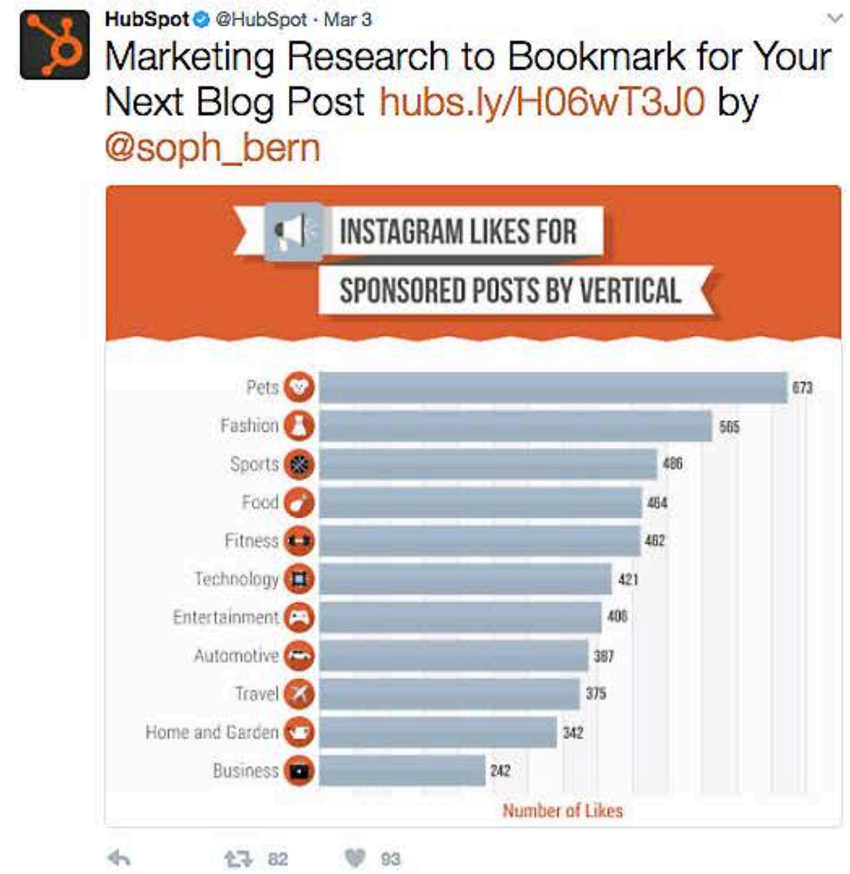
In addition to revamping the chart itself, de Cubber also altered the color scheme. As he explains it, using two different colors on the same slide (like the blue and yellow on the original slide) creates a good-bad dichotomy that could confuse people. In the redesign, he chose a monochromatic color scheme, which often ends up looking more clean and polished than using two completely different colors. (Learn more about color theory here.)

De Cubber's redesign highlights some really common data visualization flaws that show up in presentation decks all the time. Comparing data is useless if your viewer can't easily figure out the takeaways.

Why Data Visualization is Good For Your Brand

When proving the value of your product or service to potential customers, statistics and visualized data can be a powerful tool for persuading your audience and demonstrating value.

Visual representations of data can help your website visitors, email subscribers, and social media followers remember you, learn why your company is worth using, and be able to communicate these reasons to others more easily.



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CHAPTER 3: DATA TYPES, RELATIONSHIPS, AND VISUALIZATION FORMATS

Before we go into best practices for visual representation of data through charts and graphs, let's first get to know all the different types of data, the different data relationships, and the different chart types.

4 Data Types

QUANTITATIVE
Data that can be counted or measured; all values are numerical.

DISCRETE
Numerical data that has a finite number of possible values. Example: Number of employees in the office.

CONTINUOUS
Data that is measured and has a value within a range. Example: Rainfall in a year.

CATEGORICAL
Data that can be sorted according to group or category. Example: Types of products sold.

Image Source: Visage

1) Qualitative data can be counted or measured, and all values are numerical.

2) Discrete data is numerical data with a finite number of possible values. (For example, the number of employees in an office.)

3) Continuous data is measured and has a value that lies within a range. (For example, rainfall in a year.)

4) Categorical data can be sorted according to group or category. (For example, types of products sold.)

7 Data Relationships

A data relationship is **a relationship between one or more points of data.** It can be as simple as tracking the same metric over time, like blog post views over a 30-day period. It can also get much more complex than that.

Knowing how to accurately compare relationships in your data is a critical business skill. Here are seven data relationships you should know:

1) Nominal Comparison

A nominal comparison is a simple comparison of the quantitative values of subcategories. Example: number of visitors to various websites.

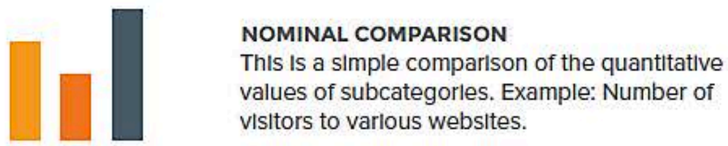


Image Source: Visage

2) Time-Series

A time-series shows the changes in values of the same metric over time.

Image Source: Visage

They're a great way to demonstrate things like trends over time, revenue quarter-by-quarter, or new leads generated in a current month or year. They're also a great choice for predictive modeling. When your boss says, "We want revenue to go up and to the right," she's referring to this type of chart.

Here's an example of a time-series showing an increase in U.S. population between 1920 and present day.

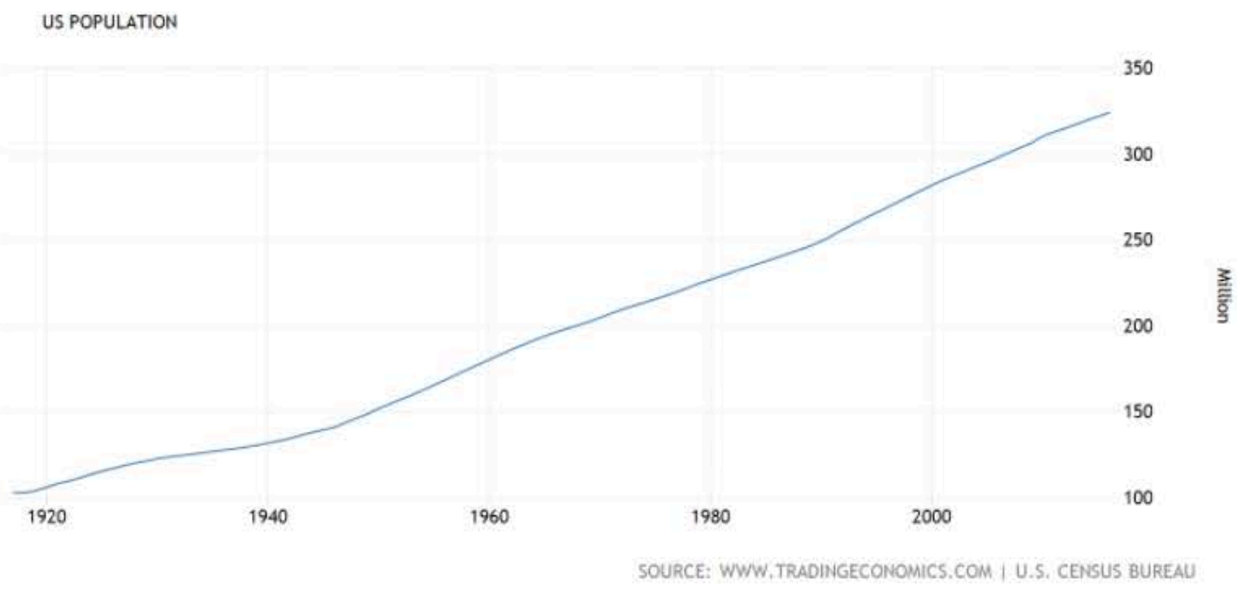


Image Source: Trading Economics

3) Correlation

This data has two or more variables that may demonstrate a positive or negative correlation with each other.

CORRELATION
This is data with two or more variables that may demonstrate a positive or negative correlation to each other. Example: Salaries according to education level.

Image Source: Visage

That bar chart comparing salary/unemployment rate and education level from earlier is a great example of correlation data.

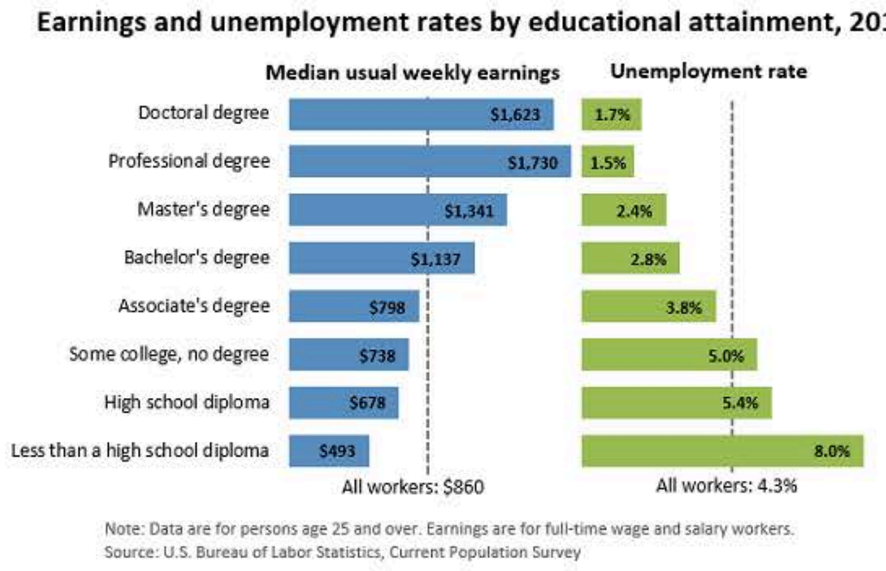
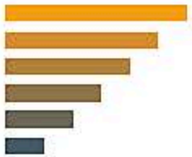


Image Source: U.S. Bureau of Labor Statistics

A word of caution: There's a common phrase in statistics that says "correlation does not imply causation." This chart shows the correlation between the salary and education level. While in this case, the two are directly related, it's important to always take heed and explore other variables that could be affecting the correlation before making any assumptions.

4) Ranking

This shows how two or more values relate to each other in relative magnitude.



RANKING
This shows how two or more values compare to each other in relative magnitude. Example: Historic weather patterns, ranked from the hottest months to the coldest.

Image Source: Visage

Heat maps are a common example of a distribution visualization. For example, the heat map below based on data from EUROSTAT shows the average population density in Europe. The areas are shaded gradually darker to demonstrate a higher concentration of people living in certain areas, which helps readers quickly identify the areas with high population density.

Average population density

(averaging period: 2004–2013)

inhabitants per km²

- >50
- 50–<100
- 100–<135
- 135–<170
- 170–<500
- >500

0 250 500 1,000 km

N

based on data from eurostat

Edited by Bogdan Antonescu

AXA Research Fund

MANCHESTER 1824 The University of Manchester

Heat maps are a good way to show a popular or highly trafficked area, whether that be on a map, on a website (showing where people are clicking the most), or throughout a store.

5) Deviation

Deviation explores how data points relate to each other, and more specifically how far a given data point differs from the mean.

DEVIATION
This examines how data points relate to each other, particularly how far any given data point differs from the mean. Example: Amusement park tickets sold on a rainy day vs. a regular day.

Image Source: Visage

An example of a deviation visualization includes amusement park tickets sold on rainy days versus regular days, or average spending over the holidays versus non-holidays. Visualizing your data in this way will help you identify outliers.

6) Distribution

This type of visualization shows data distribution often surrounding a central value.

DISTRIBUTION
This shows data distribution, often around a central value. Example: Heights of players on a basketball team.

Image Source: Visage

Here's an example of a distribution chart that examines the heights of the basketball players who played in the 2014 FIBA Basketball World Cup in Spain.

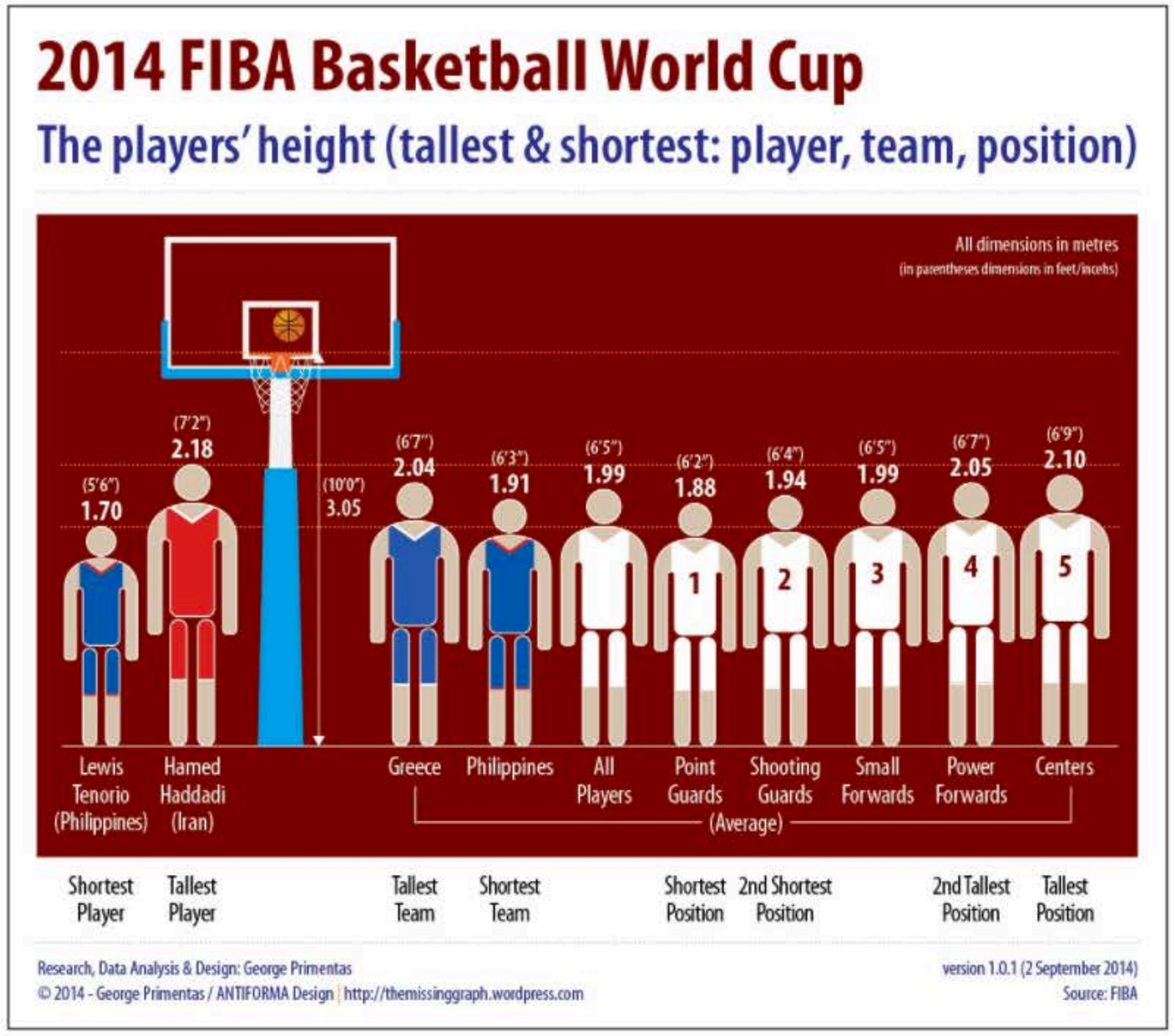


Image Source: The Missing Graph

7) Part-to-Whole

This shows a subset of data as compare to the larger whole.

PART-TO-WHOLE RELATIONSHIPS
This shows a subset of data compared to the larger whole. Example: Percentage of customers purchasing specific products.

Image Source: Visage

Part-to-whole comparisons like the one below show the makeup of a group. To show this, you can use a treemap (as in the visualization below), a pie chart, a donut chart, or anything that shows the breakdown of a singular whole. It can be a good way of visualizing distribution of ages in a group, sources of revenue, or parts of a balanced diet.

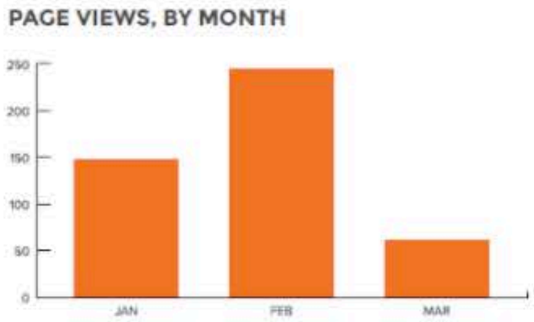
Image Source: The Data Visualisation Catalogue

7 Chart Types

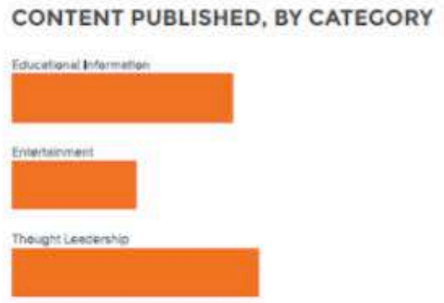
We've touched on a few of these chart types already, but let's dig in to them a little bit further with the help of illustrations from Visage.

1) Bar Charts

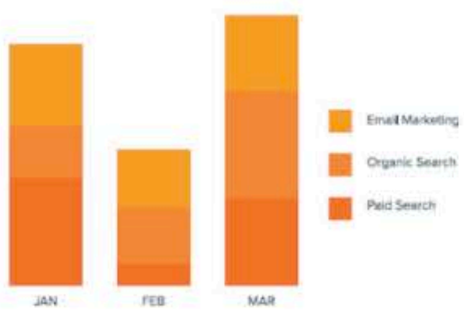
Bar charts are very versatile, They're best used to show change over time, compare different categories, or compare parts of a whole.



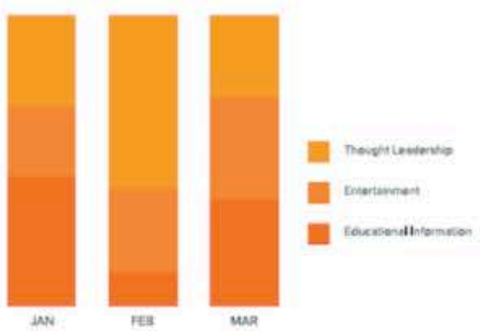
VERTICAL (COLUMN CHART)
Best used for chronological data (time-series should always run left to right), or when visualizing negative values below the x-axis.



HORIZONTAL
Best used for data with long category labels.



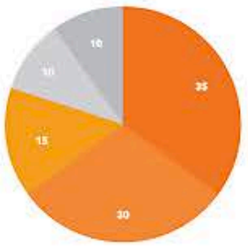
STACKED
Best used when there is a need to compare multiple part-to-whole relationships. These can use discrete or continuous data, oriented either vertically or horizontally.



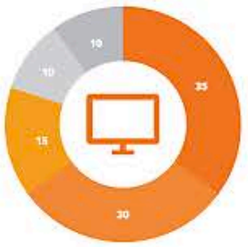
100% STACKED
Best used when the total value of each category is unimportant and percentage distribution of subcategories is the primary message.

2) Pie Charts

Pie charts are best used for making part-to-whole comparisons with discrete or continuous data. They are most impactful with a small data set.

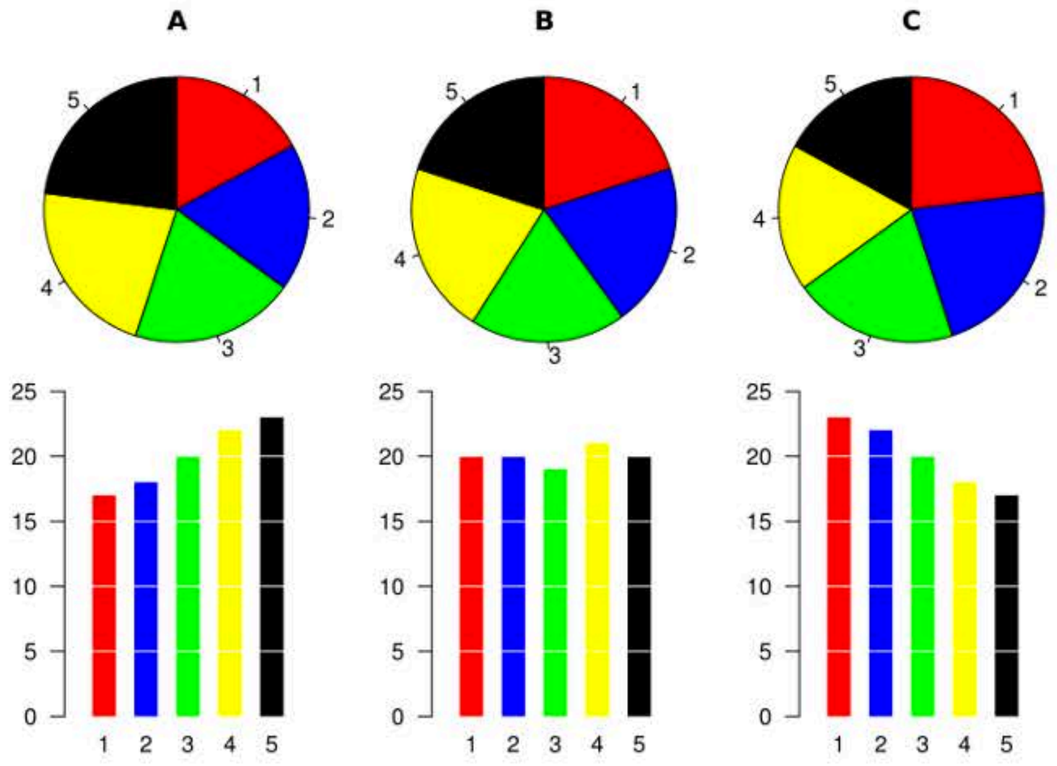


STANDARD
Used to show part-to-whole relationships.



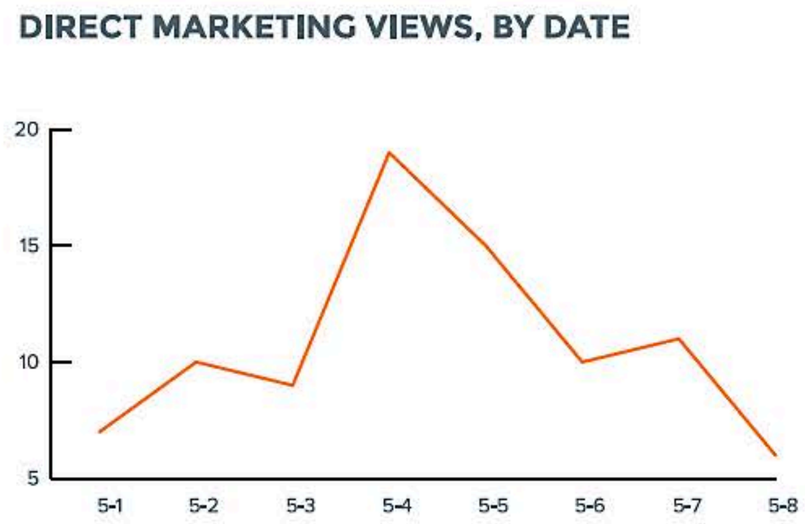
DONUT
Stylistic variation that enables the inclusion of a total value or design element in the center.

Be careful with how you use pie charts, as they can sometimes be misleading because of their shape. For example, here's an illustration of the same data set displayed as a pie graph and a bar graph:



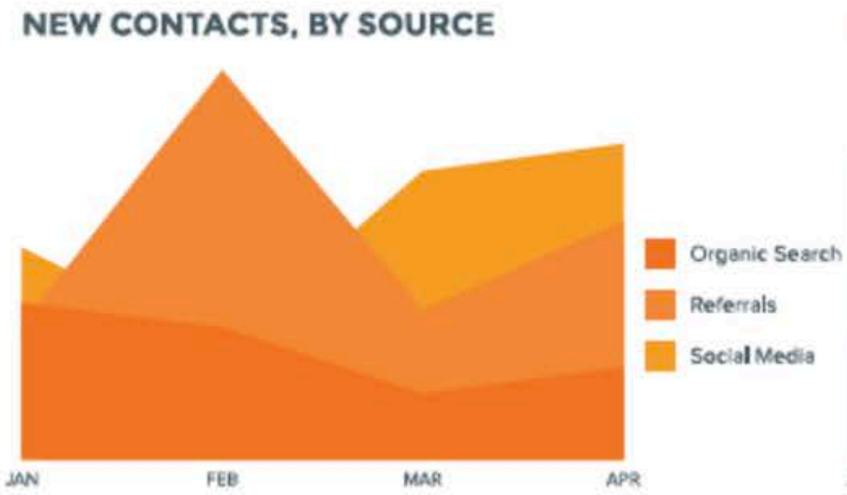
3) Line Charts

Line charts are used to show time-series relationships with continuous data. They help show trend, acceleration, deceleration, and volatility.

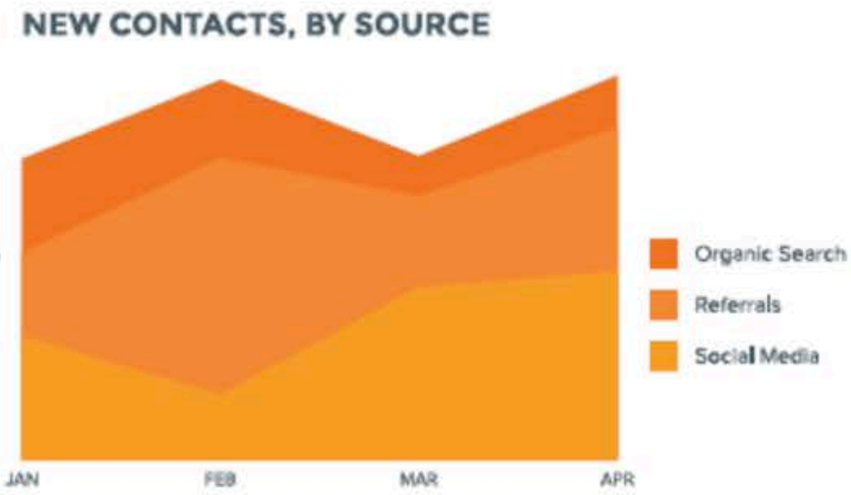


4) Area Charts

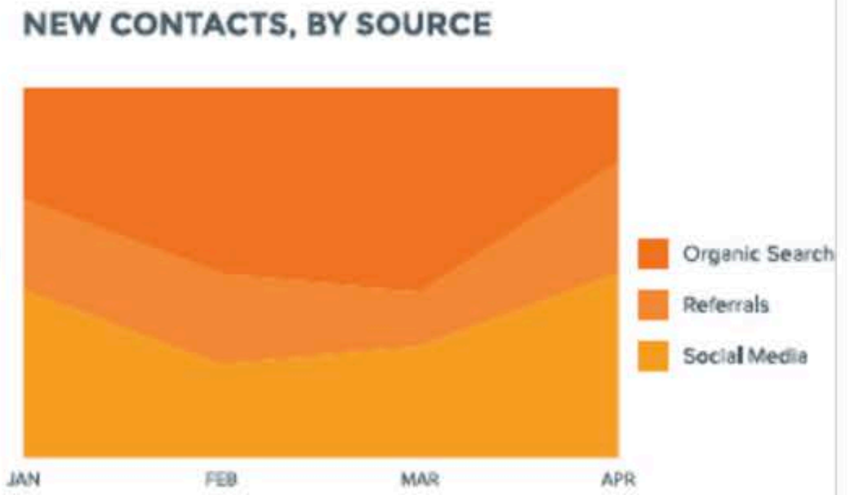
Area charts also depict a time-series relationship, but they're different than line charts in that they can represent volume.



AREA CHART
Best used to show or compare a quantitative progression over time.



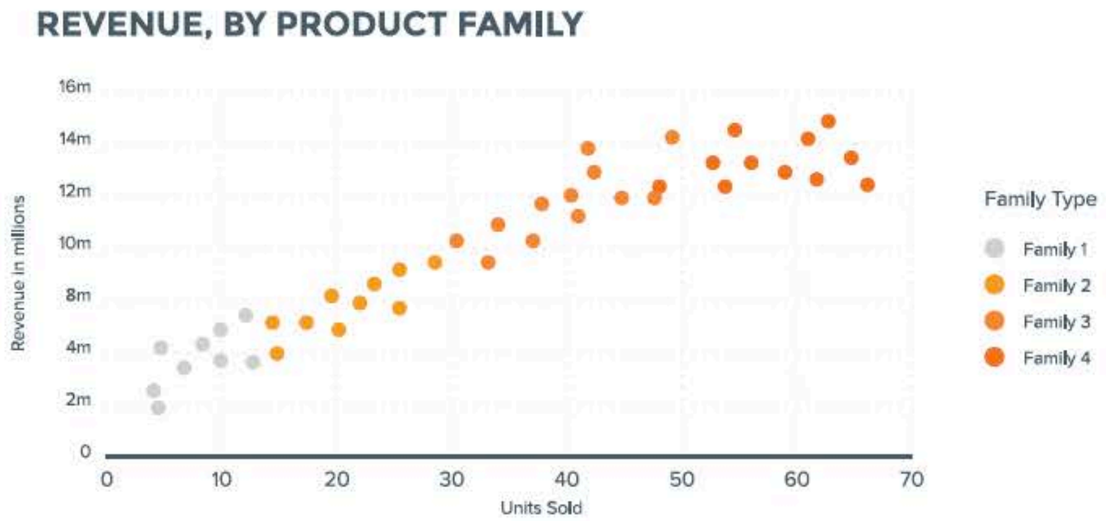
STACKED AREA
Best used to visualize part-to-whole relationships, helping show how each category contributes to the cumulative total.



100% STACKED AREA
Best used to show distribution of categories as part of a whole, where the cumulative total is unimportant.

5) Scatter Plots

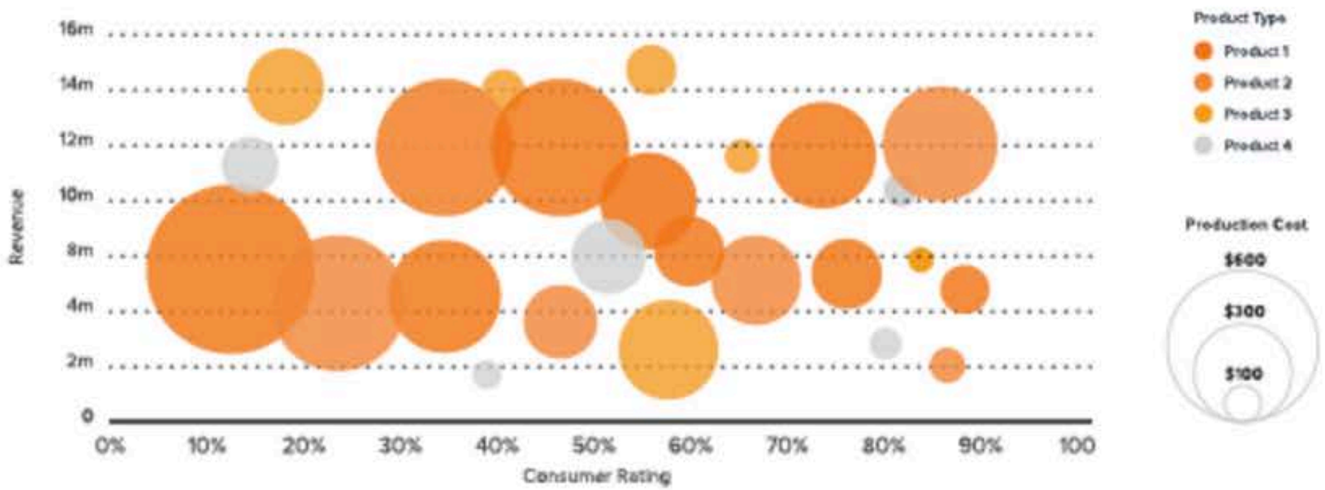
Scatter plots show the relationship between items based on two sets of variables. They are best used to show correlation in a large amount of data.



6) Bubble Charts

Bubble charts are good for displaying nominal comparisons or ranking relationships.

VARIATIONS OF BUBBLE CHARTS

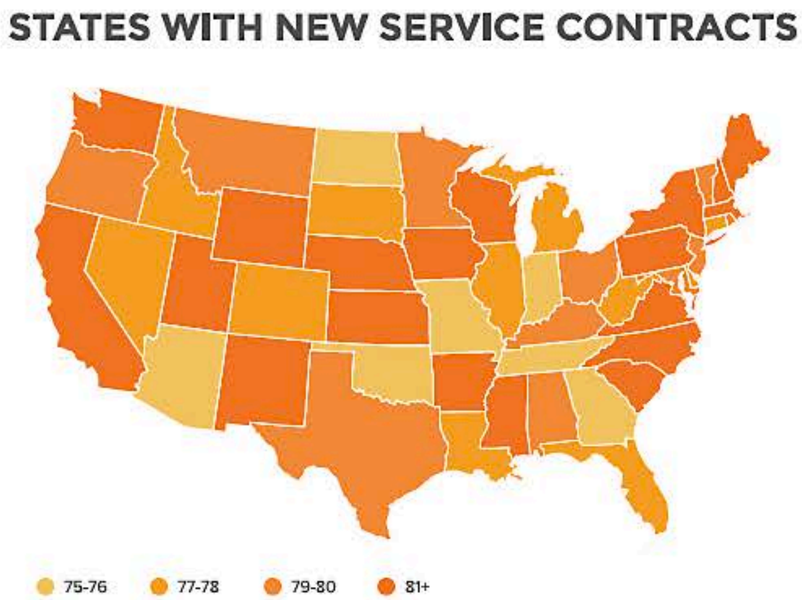


BUBBLE PLOT
This is a scatter plot with bubbles, best used to display an additional variable.

BUBBLE MAP
Best used for visualizing values for specific geographic regions.

7) Heat Maps

Heat maps display categorical data, using intensity of color to represent values of geographic areas or data tables.



There you have it. Now that you're well versed in all the different types and formats of data visualizations, let's get into how to actually create them.

CHAPTER 4: HOW TO VISUALIZE DATA EFFECTIVELY

When getting started with data visualization, here are the questions you should ask yourself.

Where and how are you getting your data?

If you don't have any data yet, you'll need to think carefully about where you're getting it. Are you gathering yourself, or are you getting it from someone else?

If you're gathering it yourself, be sure you're using the right methodology to write and launch your surveys. To learn how to use online surveys effectively, **download our free ebook, *How to Use Online Surveys in Your Marketing*.**

Get Your Surveys Ebook

If you're collecting your own data, you'll need to make sure you collect enough of it for the results to be statistically significant. Here's a refresher on statistical significance from a marketing standpoint if you need one.

If you're sourcing your data from a third party, it's very, very important that it's coming from a reliable source. What makes a good data source? A good data source is:

Original.

It comes from a primary source. If the data you find is on Wikipedia or in a news article, track down the original data so you can spot any potential flaws, low sample sizes, or biased questionnaires.

Comprehensive.

It doesn't leave questions unanswered, and it provides enough information for viewers to get the big picture and any appropriate context. In short, it tells the full story.

Image Source: Visage

Up-to-date.

The world changes quickly, so your data needs to be one or two years old at most – unless it's on a topic that hasn't changed in a long time. Use your discretion here.

Reliable.

You've verified that the source you chose was relevant, legitimate, and as unbiased as possible. You've asked yourself who collected the research and whether they have credentials, when it was last updated, and whether the organization hosting the information has a purpose or agenda that could make the data biased.

If you're not sure where to find good data, here's a helpful guide on where to find good data and how to vet it properly.

Once you do have the data aggregated, you can start thinking about how you might present it.

What story does the data tell?

For many people, the hardest part of visualizing data is looking at the raw numbers and figuring out how to use them to tell a story. In order to visualize your data properly, the first thing you need to do is tease out what's significant about your data.

Oftentimes, it's helpful to start with your goal metric. What is the primary question you're trying to answer? What is it that your team, your readers, or your audience is most curious about?

For example, let's say my goal is to increase the number of subscribers to my business blog. My primary metric, then would be number of subscribers over time. (I can smell a time-series visualization coming, but we'll get to that in a second.)

In this case, I'd add subscriber calls-to-action and lead flows (*what are those?*) to my business' blog, website, social media accounts … anywhere I'd like to drive subscribers. Then, over a period of time that I choose, I'll track the number of people who subscribe to the blog and the number of people who unsubscribe from my blog over that period of time. I might be measuring a number of other metrics like blog traffic, leads, social shares, and time on page, but because my goal is cumulative subscribers, that number is the most important piece of data to put into a visualization for my purposes.

Let's say I measured blog email subscribers over the period of several years from 2011–2014. During that time, my team employed a number of different tactics to increase email subscribers from the blog – and in the end, this is how our raw subscriber numbers shook out year-over-year:

Year	Cumulative Email Subscribers from the HubSpot Blog
2011	20,767
2012	95,888
2013	236,382
2014	380,232

From looking at that table, it's obvious that the number of email subscribers from the blog is increasing over time. That's a great start to my story … but exactly how much are subscribers increasing? From this data set alone, it's hard for me to see that there was actually quite a big jump in subscribers from 2011–2012. If I visualized it, I'd be able to ascertain that more easily, and could dig in to why.

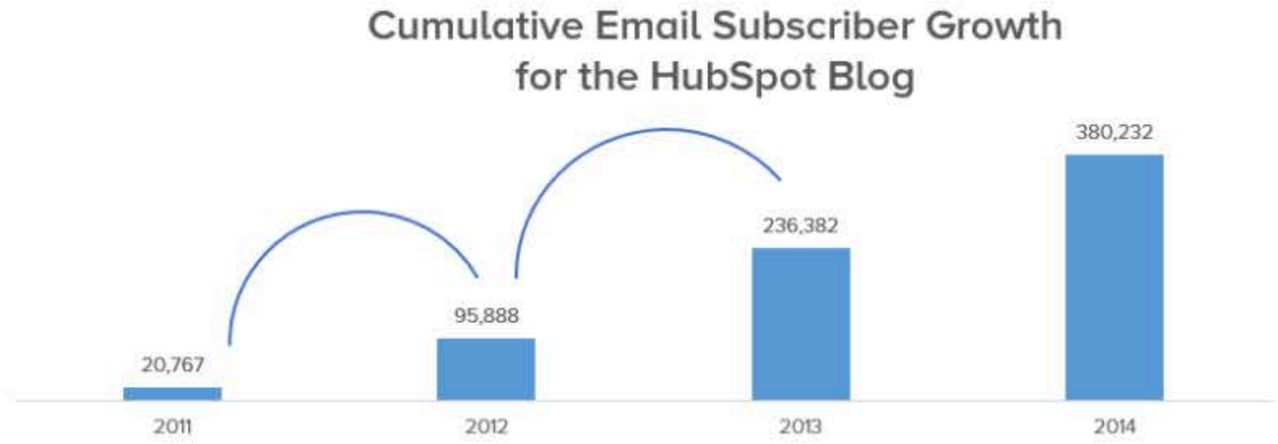
Which leads us to the next question ...

What's the best way to visualize this data?

Once you've started teasing out the story your data is telling you, you'll need to choose which type of data visualization will best tell the story.

Luckily, you've already learned all about the different data relationships and visualization formats from the previous chapter. Use that section as a guide when you're trying to figure out which format to use. Bar charts, pie charts, line charts, area charts, scatter plots, bubble charts, and heat maps all tell different stories about your data -- you need to choose the best one to tell the story you want.

In our example, measuring HubSpot's change in subscriber numbers each year calls for a time-series visualization. In this case, I could probably go with either a line graph or a bar graph. Bar graphs tend to be easier to highlight incremental differences, so they're a good go-to. Here's what our data might look like in a bar graph:



Now that the number of subscribers is visualized by the height of the bars on the chart, it's much easier to recognize how large the jump in subscribers is from 2011–2012. If we were to dig in a little deeper and look at these numbers on a month-to-month scale, we'd see that our blogging team doubled blog email subscribers in a three-month period in 2012.

That begs the question: What did our team do to make increase subscribers so quickly? The answer, I would find, is that our blogging team added subscribe opt-in checkboxes to a bunch of our landing pages in 2012 that helped us increase our email subscribers by 128% in three months.

That's where the data can help you prove or disprove a theory, uncover new insights, explain a change, and uncover what is and isn't going well.

Is it designed well?

Once you've gathered your data, sorted it, visualized it, and interpreted it, it can be tempting to rush through the design part. You've seen terrible Excel graphs creep into your colleagues' presentations ... so why should *you* have to spend so much time designing yours?

Never underestimate the importance of carefully designing your data visualization.

Remember: You're using data to share insights and spur action. You need it to be convincing, and if you display your data poorly, the meaning might get lost. Here are five data visualization design tips to help you create the most attractive, convincing, and impressive presentations possible.

Tip 1: Label your charts and graphs intuitively.

Your visualizations won't mean much to you or your audience if they aren't labeled in a way that's easy to read.

On charts that have an x-axis, make sure you use horizontal labels since vertical type can be hard to read.

Image Source: Visage

On line charts, area charts, and pie charts, it's best to label the different parts directly so people don't have to match colors with a legend.

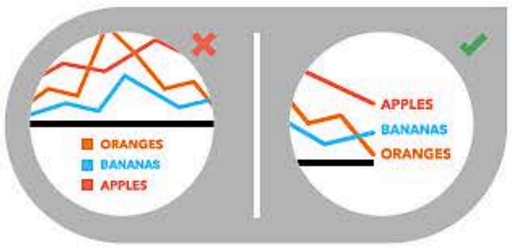


Image Source: Visage

Tip 2: Call out or highlight important information.

When you're presenting your data visualization to an audience, make the analysis easy for them. Call out important information using an arrow and text, using a circle or rectangle, or using a contrasting color.

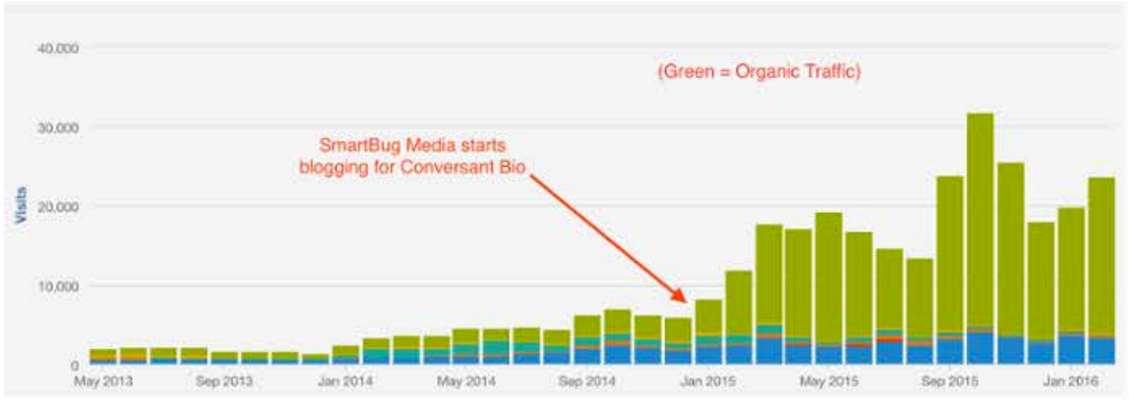
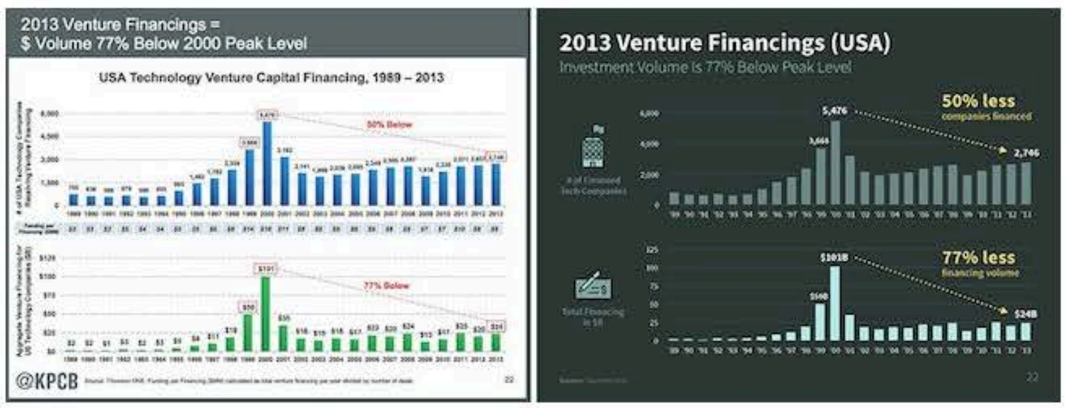


Image Source: HubSpot Marketing Blog

Tip 3: Use consistent and attractive color schemes.

Remember when the professional presentation designer named Emiland de Cubber redesigned a popular slide deck using design best practices? One of the most obvious differences between de Cubber's deck and the original is the change in color scheme.

Check it out – de Cubber's new design is on the right:

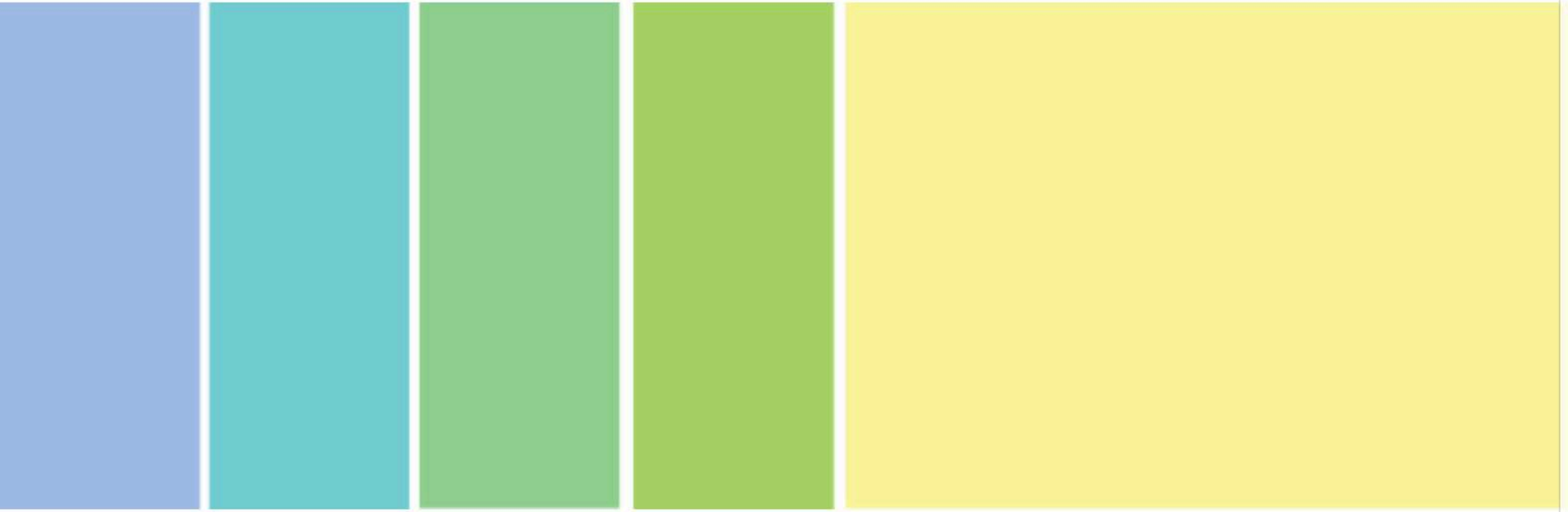


Why the change? De Cubber explained that using two different colors on the same slide creates a good-bad dichotomy that can be confusing.

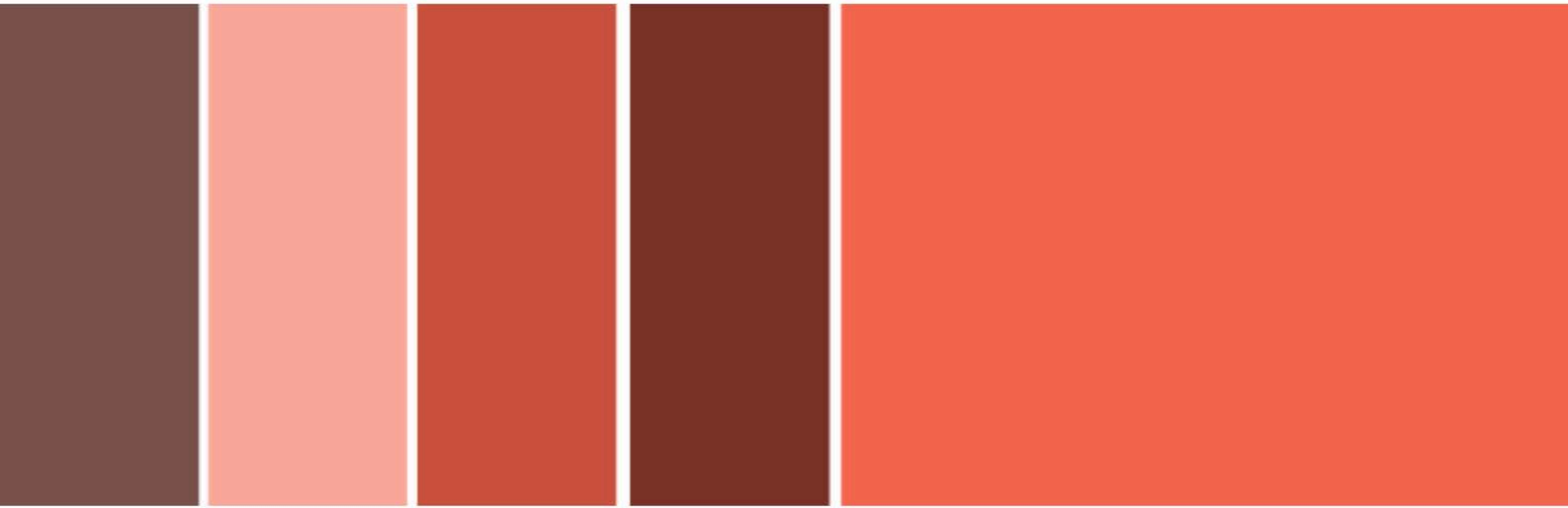
Color scheme is very important when you're creating data visualizations. Choosing colors with high contrast (like those blue and yellow bars) is easier than choosing colors that actually look good together – but trust us, taking care to choose a great color scheme is worth it.

Luckily, there are logical rules for how to create color schemes that work together. Three common color schemes are:

Analogous: a color scheme formed by pairing one main color with the two colors directly next to it on the color wheel. Typically used to create a softer, less contrasting design. This color scheme is better for an image than for a data visualization.



Monochromatic: a color scheme based on various shades and tints of one hue. This is the color scheme de Cubber used in his slide redesign. It tends to look very clean and polished, and allows you to easily change the darkness and lightness of your colors. These are great for data visualizations when you don't need to create high contrast or really grab your audience's attention.



Triadic: high contrasting color schemes that retain the same tone. It's great if you're looking to create contrast, but it can also be overpowering if all of your colors are chosen on the same point in a line around the color wheel. The triadic color scheme looks great in graphics like bar or pie charts because it offers the contrast you need to create comparisons.

Pro Tip: To subdue some of your colors in a triadic scheme, you can choose one dominant color and use the others sparingly, or simply subdue the other two colors by choosing a softer tint.

Complementary: a color scheme is based on the use of two colors directly across from each other on the color wheel and relevant tints of those colors. It's great for data visualizations because the high contrast helps you highlight important points and takeaways – especially if you use one color predominantly and use the second color as accents in your design.

(Read this blog post to learn more about color theory.)

Tip 4: Order your data sets logically.

The way you order your data matters. It's much easier for you and an audience to understand a visualization when the data is ordered intuitively.

If you're creating a bar chart, for example, then make sure larger values are at the top (for horizontal bar graphs) or from left-to-right (for vertical bar graphs). So don't order your bar graph like this:

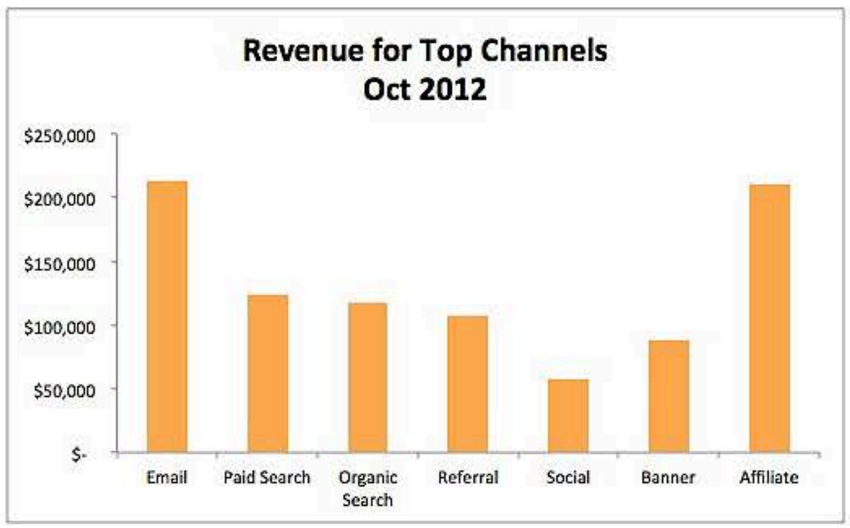


Image Source: Search Engine Land

Instead, order it like this:

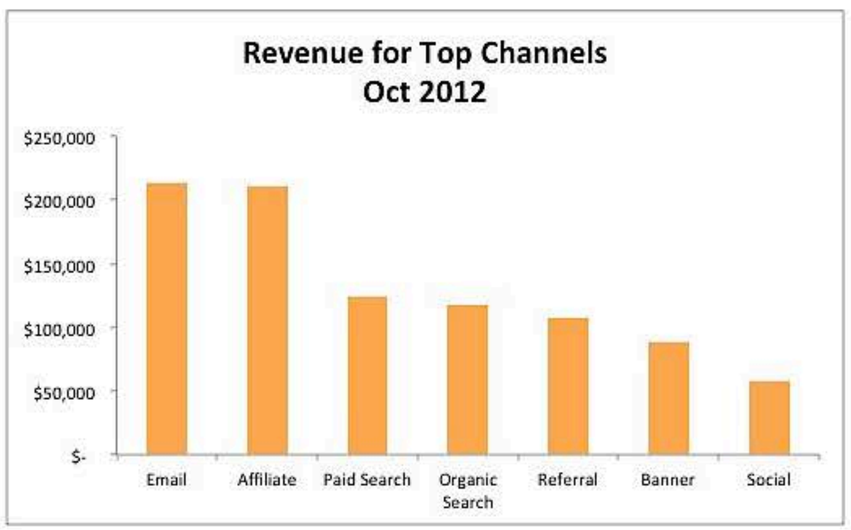


Image Source: Search Engine Land

Tip 5: Stay away from 3D charts.

Making charts 3D can make your visualization really hard to read correctly. Because of the way your visualization tilts,it gives the reader a skewed sense of what the data actually means. Since you're using data to tell a broad story, you don't want to weaken your argument due to poor design. See how different a pie chart looks when it's in 2D versus 3D?

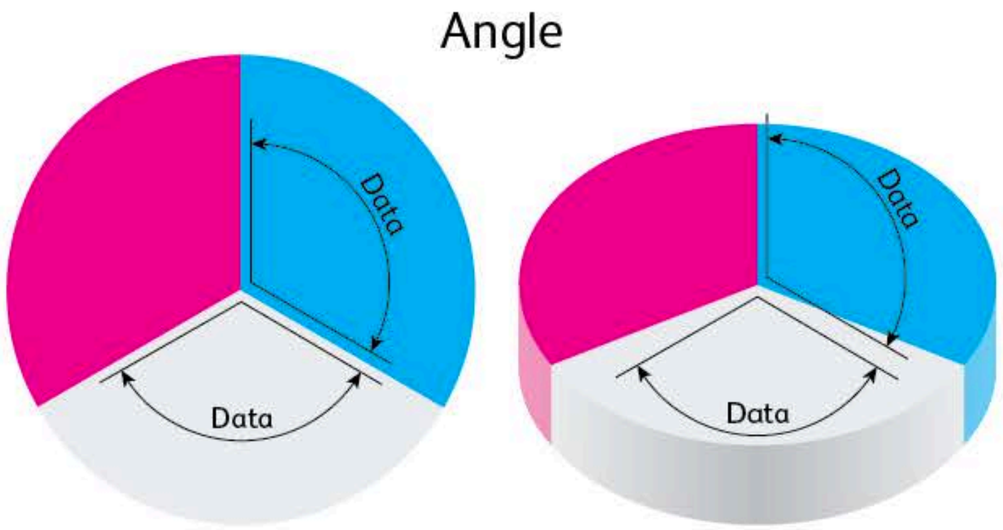


Image Source: Visually

And if you actually look at the area each section takes up on the screen, you'll see why it's easy to misinterpret 3D graphs:

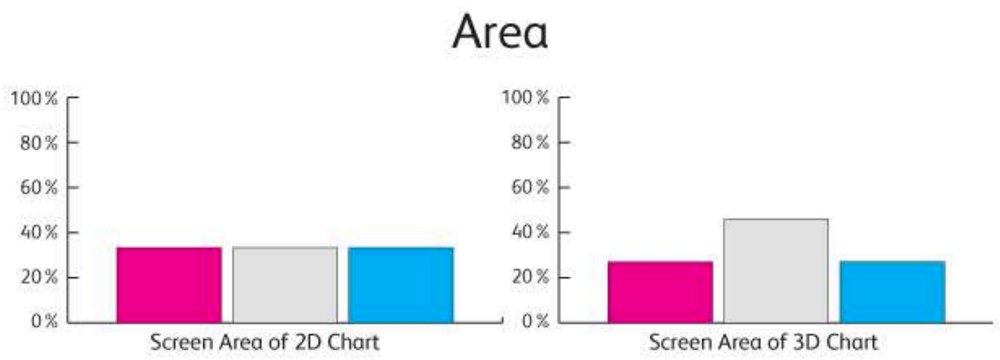


Image Source: Visually

Tip 6: Choose appropriate data ranges.

In a data set, the range is the difference between the lowest and highest values. In a data visualization, you might use data ranges in your legend to consolidate something like age ranges. But the range can make your visualization really misleading if you use inconsistent ranges.

To combat this, select 3-5 numerical ranges that enable fairly even distribution of data between them, and use +/- signs to extend high and low ranges.

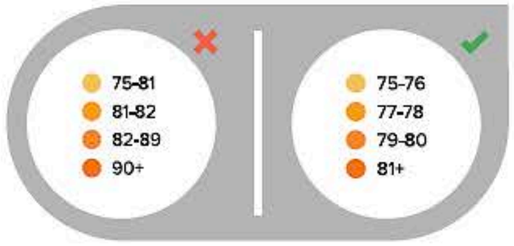
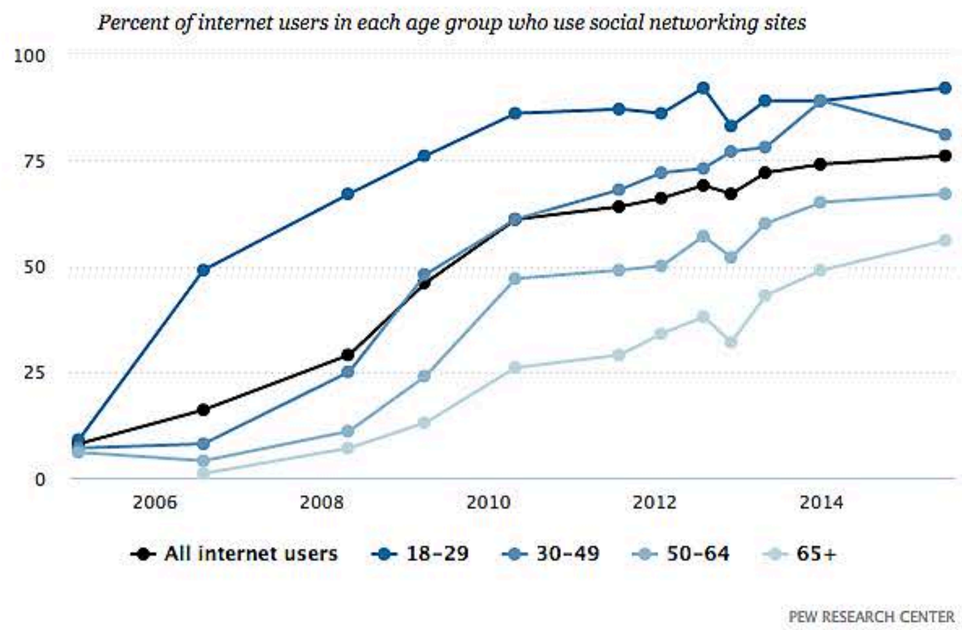


Image Source: Visage

Here's an example of consistent data ranges from Pew Research Center:



Want Excel tips for sprucing up ugly charts and graphs? Read this post for 10 design tips and tutorials for making your Excel graphs more beautiful.

CHAPTER 5: DATA VISUALIZATION TOOLS

There are many different tools and data visualization software out there that you can use at varying levels of expertise to analyze and present data. Here are a few favorites.

Microsoft Excel

This is the most common tool for data visualization. Excel allows you to sort and analyze data, then create data visualizations using the chart wizard. To learn more about using Excel, check out these resources below.

Free Ebook: "How to Use Excel"

Blog Post: The Best Resources for Learning Excel

Statista

Statista is a database of studies, statistics, and forecasts that provides market data for presentations.

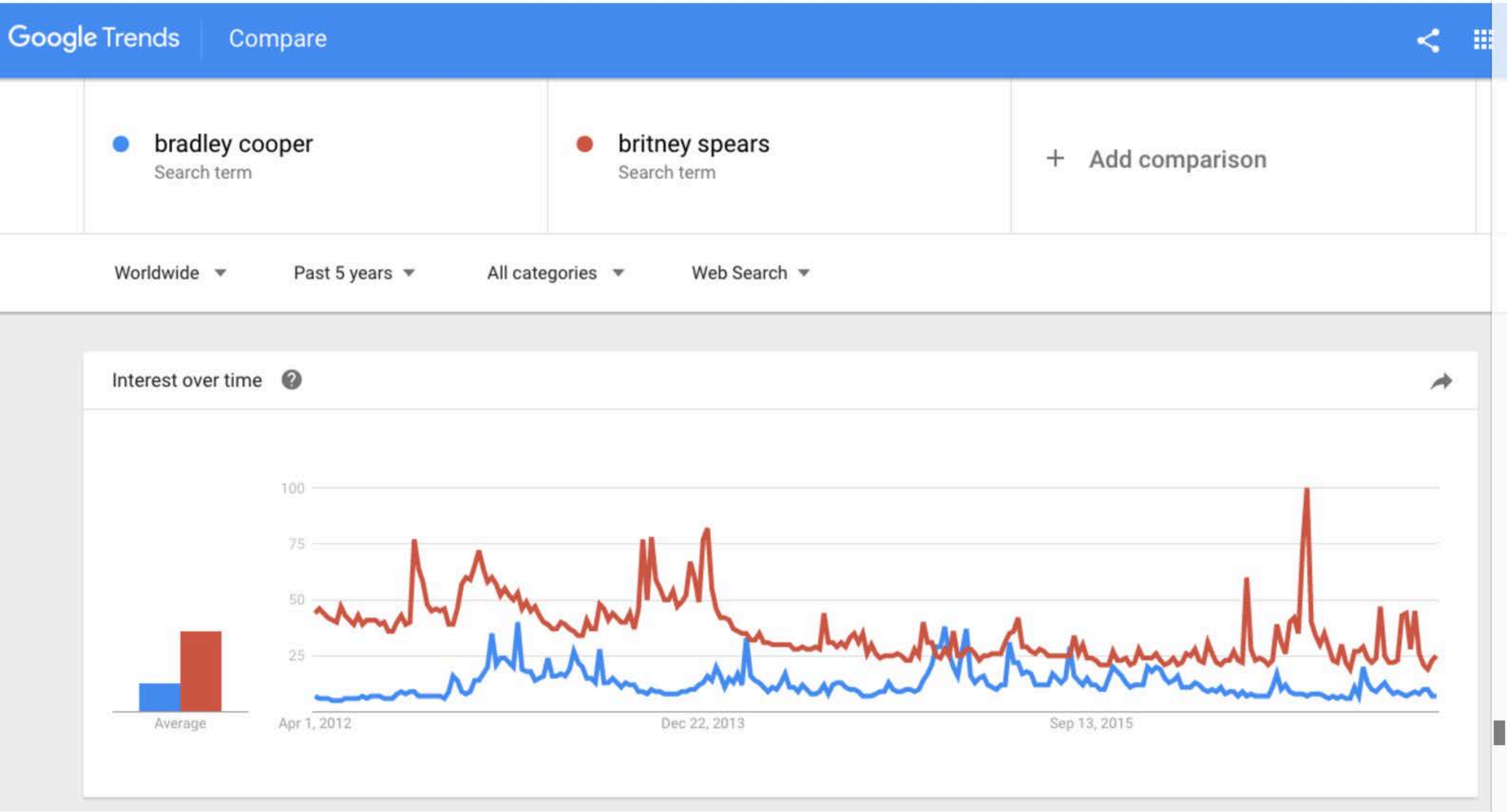
HubSpot Research

This free website allows you to make your own presentation using the latest marketing and sales statistics and charts.

Visit the HubSpot Research Website

Google Trends

Google Trends is a free tool from Google that shows search history of certain topics and keywords over time. You can evaluate the popularity of certain terms, compare them against other keyword variations, analyze how their popularity varies over time and in different regions/languages, and shows related keywords, which can be helpful in getting new keyword suggestions.

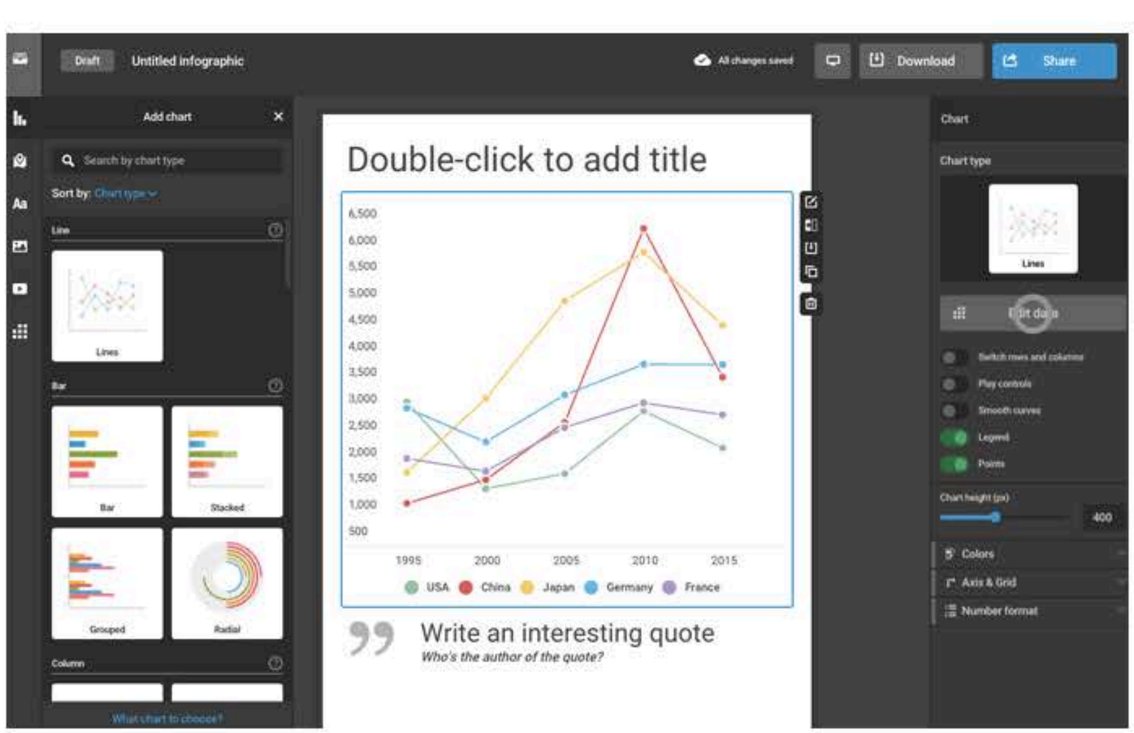


SocialMention

SocialMention lets you monitor user-generated content mentions online. This is a great tool to measure and show brand awareness and engagement.

Infogr.am

Infogram is a tool to create infographics and charts. It is ideal for those with little design experience to create and customize infographics. Alternatively, you can download some simple, pre-made infographics templates here.



Photoshop & Illustrator

For more advanced designers, you can use Adobe Photoshop and Adobe Illustrator to create beautiful and more elaborate data visualizations. These are a great option to create long form infographics and brand visualizations.

Blog Post: The Ultimate Photoshop Tutorial for Beginners

Blog Post: The Best Photoshop Tutorials

Canva

Canva is a really easy-to-use free tool with a new charts feature for creating simple pie charts, bar graphs, and more in any sized template. This is a great option for creating presentations, infographics, and social images.

Free Templates: 195+ Design Templates Using Canva, PowerPoint & More

Tableau

Tableau offers sophisticated data visualization and integrations with data visualization software like Excel, which helps you easily make raw data into beautiful visuals.

Google Charts or Google Sheets

Google Charts lets you embed graphs and charts onto a web page. It is an API tool that lets you create custom graphs and charts with the option to animate them for a more dynamic visualization. Google Sheets (Google's version of PowerPoint) is a good option for creating simple charts and graphs like you would in Excel.

CHAPTER 6: GLOSSARY OF KEY TERMS

Bar Chart/Bar Graph

A graphic means of quantitative comparison using rectangles with lengths that are proportional to the measure of the data or things being compared.

Big Data

An accumulation of data that's too large and complex for processing by traditional database management tools.

Categorical Data (Qualitative Data)

Categorical data representing characteristics such as a person's gender, marital status, hometown, or the types of movies they like.

Conditional Formatting

Conditional formatting quickly highlights important information in a spreadsheet in Excel.

Learn conditional formatting in our free Excel ebook.

Data

Information in numerical form that can be digitally transmitted or processed.

Data Analysis

The process of evaluating data using analytical and logical reasoning to examine each component of the data provided.

Data Set

A data set is a collection of related, discrete items of related data that may be accessed individually or in combination or managed as a whole entity.

Data Visualization

A graphical representation of numerical data.

Data Visualization Software

Provides the conversion of textual and numeric data into visual charts, figures and tables. It ' used as a means of creating application/system performance or operational dashboards by bringing in important data to a central interface.

Histogram

A type of data visualization showing how data is distributed, presenting frequency counts across a range of categorical values or intervals.

Information Design

The detailed planning of specific information that is to be provided to a particular audience to meet specific objectives.

Interval

Numeric scales in which we know not only the order, but also the exact differences between the values.

Line Chart

A style of chart created by connecting a series of data points together with a line.

Nominal

Nominal scales are used for labeling variables, without any quantitative value.

Numeric Data (Quantitative Data)

Data expressed with digits as opposed to letters or words.

Open Source

Something people can modify and share because its design is publicly accessible.

Ordinal

Ordinal scales are the order of the values is what's important and significant, but the differences between each one is not really known, typically measures of non-numeric concepts like satisfaction, happiness, discomfort, and so on.

Pivot Table

A program tool that allows you to reorganize and summarize selected columns and rows of data in a spreadsheet or database table to obtain a desired report. A pivot table doesn't actually change the spreadsheet or database itself.

Blog Post: How to Create a Pivot Table in Excel

Pie Chart

A graphic representation of quantitative information by means of a circle divided into sectors, in which the relative sizes of the areas (or central angles) of the sectors correspond to the relative sizes or proportions of the quantities.

Population

The entire pool from which a statistical sample is drawn. The information obtained from the sample allows statisticians to develop hypotheses about the larger population.

Range

The difference between the lowest and highest values in a data set.

Ratio

The result of one number or quantity divided by another. Ratios are the simplest mathematical (statistical) tools that reveal significant relationships hidden in mass of data, and allow meaningful comparisons.

Sample

A set of observations drawn from a population.

Scatter Plot

A way of visualizing data that displays values for two quantitative variables plotted along a horizontal x-axis and vertical y-axis.

Scientific Visualization

The representation of data graphically as a means of gaining understanding and insight into the data.

Trend

A pattern of gradual change in a condition, output, or process, or an average or general tendency of a series of data points to move in a certain direction over time, represented by a line or curve on a graph.

Value

A numerical quantity that is assigned or is determined by calculation or measurement.

CONCLUSION

There you have it, folks!

Data visualization can seem difficult and overwhelming, but with the tools and resources provided in this guide, you will be ready to start creating compelling data visualizations, persuasive presentations, and find trends in the data you already have.

Good luck out there, and be sure to download our free ebook, *How to Use Excel: Essential Training for Data-Driven Marketing*, to learn how to visualize data effectively using Excel.

Click here to download our free Excel ebook for beginner's.